IMPLEMENTATION OF GEOPORTAL IN OPEN ENVIRONMENT FOR THE COMMUNITY OF HUMAN SCIENCES AND SOCIETY

1. Introduction

The Center for Digital Geospatial Resources M²ISA (Centre de Ressources Numériques – Méthodologies pour la Modélisation de l'Information Spatiale Appliquée aux Sciences de l'Homme et de la Société) is a structure which consists of about ten partners localized in geographically distant places called sites. To the scientific community of the Human Sciences and Society (SHS) they give knowledge and data which have a special characteristic: the spatial dimension. A Geoportal is under construction to enable communication. The CNRS M²ISA is a structure placed in the UMR 8564-CEIAS; they have the characteristics of a *Spatial Data Infrastructure* (Masser 2005) according to the European directive of November 2006[1]. The partners belong to the network of the Houses of the Human Sciences and Society[2].

2. Presentation of Geoportal: hybrid multi-third party architecture

The Geoportal project dedicated to the SHS community presents two main aspects: scientific and technical.

From a scientific point of view, there are various objectives: sharing, broadcasting, consultation, interrogation, manipulation, extraction, and visualization with the possibility of changing symbology and the geoprocessing of spatial and/or thematic data. These various functions will have to be accessible by intranet or extranet. It will give an international scale to the research projects as well as the possibility to make better use of their results

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[1] INSPIRE Directive: http://www.ec-gis.org/inspire/. Maison des Sciences de l'Homme de Besançon, UMR 6565 – Laboratoire de Chrono-Ecologie; Maison des Sciences de l'Homme de Dijon, UMR 5594 – Archéologie cultures et sociétés en Bourgogne; Ecole de Hautes Études en Sciences Sociales-Paris-UMR 8558 – Centre de Recherches Historiques.

[2] http://www.msh-reseau.prd.fr/. The partners are: Fondation de la Maison des Sciences de l'Homme – Paris, UMR 8564 – CEIAS-CCT MASSIG; Maison des Sciences de l'Homme de Tours, Ville et territoires, UMR 6173 – CITERES – Laboratoire Archéologie et Territoires, Tours; Maison des Sciences de l'Homme de Caen, UMR 6063 – IDEES – GéoSysCom; Centre d'études et de documentations économiques, juridiques et sociales, Le Caire, Ministère des Affaires Etrangères – CNRS – URA 1165; Maison de l'Archéologie et de l'Ethnologie René Ginouvès de Nanterre, UMR 7041 – Archéologie et Sciences de l'Antiquité; Maison de l'Orient Méditerranéen de Lyon CNRS – FR 538; Maison des Sciences de l'Homme de Nice, UMR 6130 – Centre d'Étude, Préhistoire, Antiquité, Moyen Age; Maison des Sciences de l'Homme de Besançon, UMR 6565 – Laboratoire de Chrono-Ecologie; Maison des Sciences de l'Homme de Dijon, UMR 5594 -Archéologie cultures et sociétés en Bourgogne; Ecole de Hautes Études en Sciences Sociales, Paris – UMR 8558 – Centre de Recherches Historiques. The person in charge of the center of digital resources M²ISA is Françoise Pirot (UMR8564 – CEIAS-CNRS).

by giving access to the initial and/or diverted data stemming from these. It will also allow the mutualization of processing tools of spatial data accessible from the Geoportal.

The technical aspects lie in the fact that the reserved solution is a multi-third party architecture, modular and open. This is articulated around a core of two modules of the software ArcIMS (Arc Internet Map Server): ArcIMS Application Server and ArcIMS Spatial Server. Around the core, several interfaces were developed by means of freeware and object-oriented programming language:

– a customer interface developed from HTML/Javascript which offers a generic user model of sight;
– an interface for synchronization/replication of data: JSP, FTPS;
– an interface for the creation of cartographic services, integrated into a web server platform operated (Apache and Tomcat). This architecture makes it possible to develop components integrated into it, and to add on new ones.

Server side: the tools of processing are stored in the form of servlets, which constitute all the intelligence of the system. The customer interface interacts with servlets thanks to the DWR framework, which allows using, in asynchronous mode, Javascript to execute situated servlets of the server side. The exchange user-server is realized in XML and ArcXML, then parsed by JDOM. The use of servlets Java server side gives the possibility of implementing personalized features. The implementation of these servlets on the server strengthens the level of security of the system in its global nature.

User side: the personalized computer architecture foresees several accesses, the userresearcher and/or the data supplier. The user-researcher connects to the site to use previously installed cartographic services. The user has the possibility of performing certain tasks: visualization, modifications, addition of layers, extraction, spatial analysis. The data supplier can pass on services, such as cartographic services and data via specific network interfaces: JSP, FTPS. The data supplier gives cartographic services which are automatically joined into the architecture and directly consumable by the simple user. The supplier can also be a simple user. To ensure compatibility with the existing computer systems, the extraction of data is made in formats of standard exchanges. The architecture presented in Fig. 1 is different from the standard use of ArcIMS.

In a traditional procedure, such an architecture would have required more financial means, which would have given two possibilities:

– to have a license by the data supplier to create local projects without synchronization. The inconvenience is that the possibilities of customization are limited and the projects have different features according to the knowledge of the local administrators who create them;
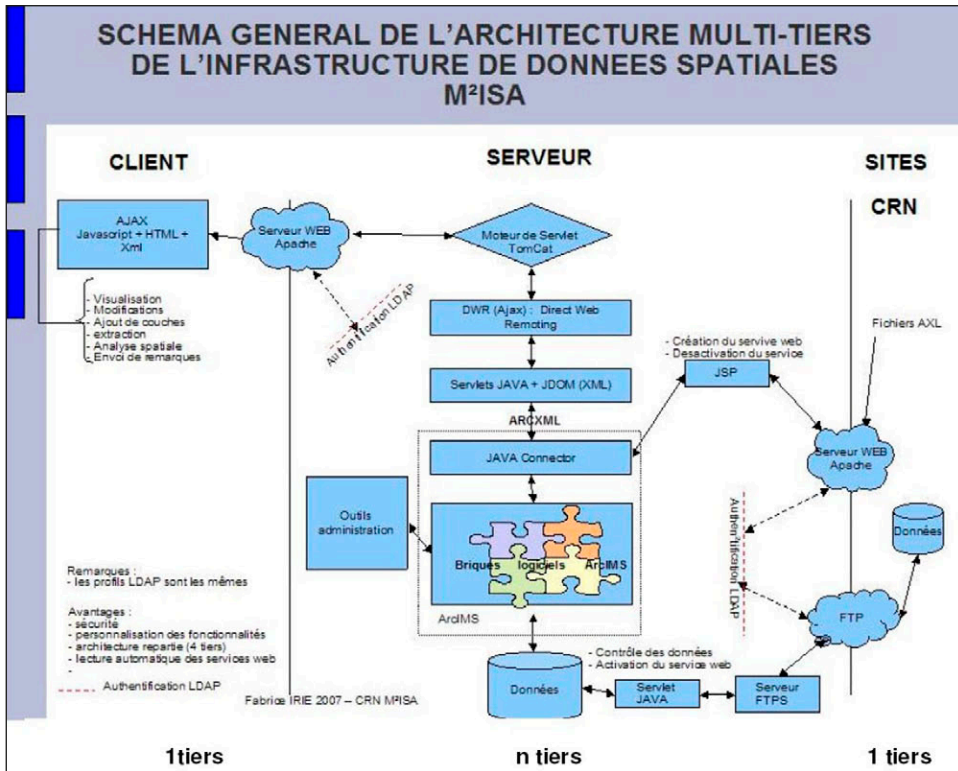– a floating license for multi-users to allow every supplier to connect to the

Fig. 1 – General Schema of the multi-third party architecture of the spatial data infrastructure.

server to create and deposit cartographic services. The cost of these types of licenses is much higher without bringing additional features.

The use of the architecture we propose clears the supplementary cost, the incompatibility of the features from one site to the other, to propose to the users the same interface and credits, to exploit the services.

To accompany the actual implementation of the architecture presented previously, a "Platform system" is associated which consists of three services implemented (operated) with freeware and of standard protocols: authentification with LDAP; transfer of data with FTPS; web.

The idea is to de-correlate the central software platform (ArcIMS), so as to make it independent. At the same time it allows to use existing and chosen systems, and to make the project as portable as possible.

The authentification with LDAP manages the users of the project who belong to at least three types of population: administrator of the system and software (P1); user/researcher (P2); supplier of data and services (P3).

Two sectors will be developed concerning the consideration and the management of the users. The first one consists in setting up a unified system of authentification, recovering at the same moment three types of concerned populations. The choice of the unification of these systems of authentification was made on a unified electronic directory LDAP which manages the set. The second concerns the implementation of a platform of synchronization and replication of the data on the basis of a service secured in FTPS, coupled with the system of authentification LDAP.

Tests are conducted in a technical environment including Unix/Solaris, Linux, Apache, J2EE:

– portability and global opening of the project with regard to the various existing platforms. In this framework, we only test these aspects on Solaris, Sun and Linux platforms. Given the specificities and the nature of the platforms of this project, an experiment is made to test the compatibility of electronic directories like Sun (SunDS) and OpenLdap;

– estimation of the capacities of platforms used to assure the loads which will be requested.

These tests will also serve as a means of calibrating resource needs for this kind of projects, often badly estimated in terms of infrastructure, given the limited data on this problem.

All the developments, the implementations and the tests are realized within the CRN M²ISA and the service of the computing resources of the House of the Humanites of Paris.

3. Presentation of examples in Human Sciences and Society

Some examples are presented from Geoportal M²ISA and are the results of specific research works (Minelli, Pirot 2007; Pirot *et al.* 2007). The cartographic services, created under the software ArcIMS, are the data source for the application of Geoportal. The cartographic services consist of active spatial and/or thematic levels of geo-referenced information called layers. The spatial and/or thematic information contained in these layers is dynamic, accessible, searchable and is presented in two exchange formats, corresponding to the geographical standards ISO TC211: the first is a shapefile format, georeferenced for the spatial structures in vector mode; the second is a format embellished with images, georeferenced for the spatial structures in mesh raster mode as for example the geotiff.

The cartographic services are written in ArcXML or AXL. The language ArcXML or AXL is an XML language adapted to the spatial structures. Tools included in the software bricks ARCIMS (ARC Internet Map Server) allow to generate the code AXL, and to create cartographic services.
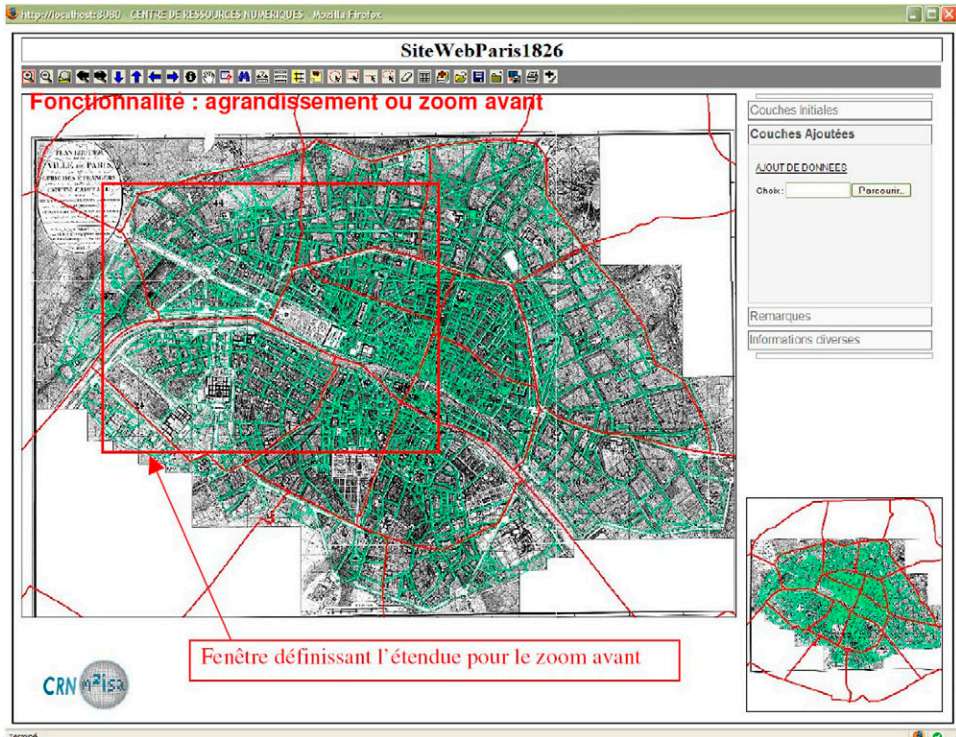
Fig. 2 – Paris project in 19th century.

The sites of the partners of the Center of Digital Resources M²ISA are the producers and data suppliers. Every site develops its own cartographic service, which will then be deposited on the server through the network and exploited in the air. At present, every site is a MSH. MSH sites store and administer their spatial data so that they can be accessible from the server via, an interface developed in Java (Figs. 2, 3).

4. Conclusion

The application of Geoportal M²ISA dedicated to the community of the Human Sciences and Society (SHS) exists at present in the form of a prototype which must be tested and validated. This application will allow the users to mutualize, share, and broadcast initial or derived geographical and/or thematic information (results of geoprocessing) existing in the form of created cartographic services, installed within MSH. Users can also consult, query, and make extractions as well as spatial analyses.
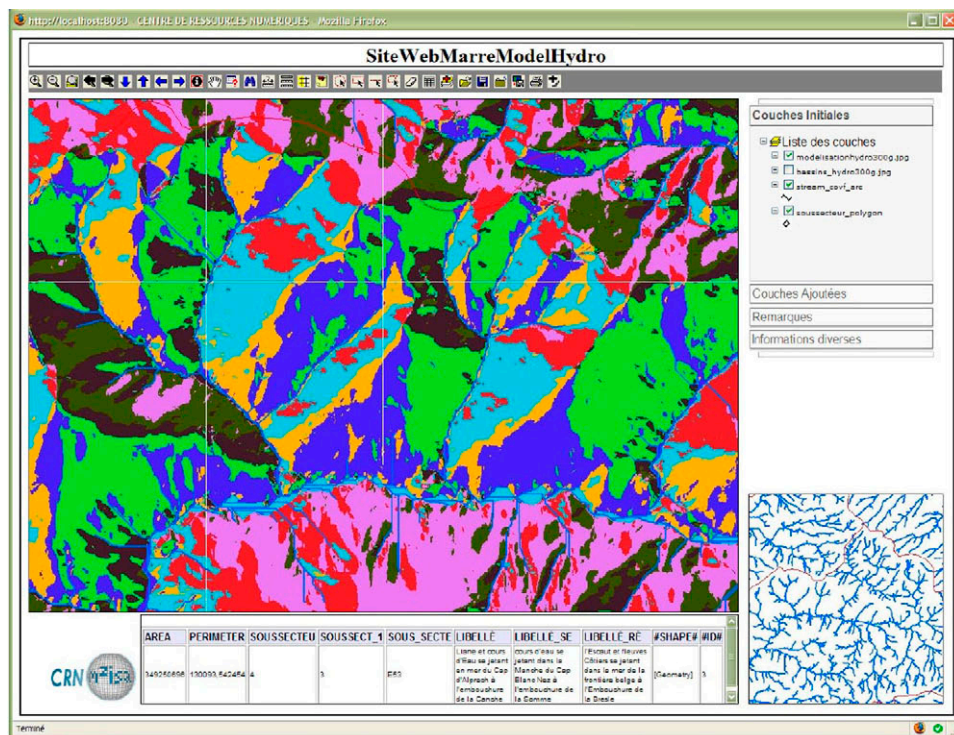
Fig. 3 – Nord-Pas-de-Calais project. Hydrological modelling: direction of the drainage of waters.

The end user is connected through any navigator. No particular software is installed. In effect, the entirety of "intelligence" and potency of the application are installed on the server. It is not necessary to install a license of the ArcIMS software. The menu bar of the features of the Geoportal is the same for all users wherever the physical location of the cartographic services may be.

This application is articulated around freeware (DWR and JDOM) and the software owner ArcIMS. This shows the possibilities of opening the accessibility of the ArcIMS software to make use of its features without having to install the ArcIMS software on the various MSH sites.

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ABSTRACT

The Center for Digital Geospatial Resources «Methodologies of Modelling for the Spatial Information Applied to Human Sciences and Society»(M²SIA – M²ISA) was created in March 2006 by the CNRS. The purpose is to facilitate the pooling, exchanges, access, transmission, broadcasting, and mutualization of spatial data as well as respect the international geographical standards of the ISO/TC211 from a portal and from a geoportal. The CSDR M²SIA (CRN M²ISA) is constituted by ten partners who belong to the network of the MSH. This structure depends on multi-third party architecture in open environment. One of the third parties of this architecture is constituted by the suppliers of data who correspond to the various MSH sites. These sites give cartographic services created under the ArcIMS software with the AXL language. These services are automatically joined into the architecture and directly consumable by the simple user via an interface developed in Javascript, HTML. The AJAX and Web 2.0 technologies are implemented.